10-24-1966

Test 951: International 500 (Diesel)

Tractor Museum
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NEBRASKA TRACTOR TEST 951 - INTERNATIONAL 500 DIESEL

POWER TAKE-OFF PERFORMANCE

	Hp	Crank-shaft speed rpm	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
*	36.65	2000	2.626	0.499	13.96	184	61	75	29.043
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
	32.12	2062	2.292	0.497	14.01	174	61	74	.....
	0.00	2224	0.862	.....	.....	158	60	74	.....
	16.70	2146	1.516	0.632	11.02	171	60	74	.....
	36.48	1998	2.636	0.503	13.84	186	61	75	.....
	8.51	2183	1.155	0.945	7.37	166	61	75	.....
	24.62	2108	1.891	0.535	13.02	173	61	76	.....
Av	**19.74**	**2120**	**1.725**	**0.609**	**11.44**	**171**	**60**	**75**	**29.040**

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cool-ing med	Air wet bulb	Air dry bulb	Barom-eter inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear (2nd DD)											
30.55	5237	2.19	2001	3.34	2.695	0.614	11.34	181	30	31	29.270
75% of Pull at Maximum Power—Ten Hours—4th Gear (2nd DD)											
24.63	4023	2.30	2065	1.94	2.234	0.632	11.03	180	45	54	28.893
50% of Pull at Maximum Power—Two Hours—4th Gear (2nd DD)											
16.72	2632	2.38	2127	1.39	1.741	0.725	9.60	174	51	55	29.190
MAXIMUM POWER WITH BALLAST											
30.53	7957	1.44	2002	6.09	3rd Gear (2nd TA)			179	32	34	29.080
31.36	5307	2.22	2001	2.37	4th Gear (2nd DD)			175	48	52	29.000
30.47	4825	2.37	2003	2.34	5th Gear (3rd TA)			174	48	52	29.000
30.41	3582	3.18	1996	1.62	6th Gear (4th TA)			162	48	52	29.000
30.45	3223	3.54	2001	1.37	7th Gear (3rd DD)			175	48	52	29.000
30.34	2600	4.38	1998	0.94	8th Gear (5th TA)			173	48	52	29.000
30.11	2372	4.76	1997	0.82	9th Gear (4th DD)			178	49	53	29.000
28.67	1649	6.52	2003	0.63	10th Gear (5th DD)			172	49	53	29.000

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear (2nd DD)

Pounds pull	5307	5658	5956	5905	5934	5658
Horsepower	31.36	29.78	27.90	24.28	20.88	16.61
Crankshaft speed, rpm	2001	1790	1599	1401	1201	999
Miles per hour	2.22	1.97	1.76	1.54	1.32	1.10
Slip of drivers, %	2.37	2.76	3.06	3.00	3.17	2.88

Department of Agricultural Engineering

Dates of Test: OCTOBER 24 TO NOVEMBER 2, 1966

Manufacturer: INTERNATIONAL HARVESTER COMPANY OF CANADA LTD., HAMILTON, ONTARIO, CANADA

FUEL, OIL and TIME Fuel No 2 diesel **Cetane No** 57 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.8363 **Weight per gallon** 6.964 lb **Oil** SAE 20-20W **API service classification** DS **To motor** 1.969 gal **Drained from motor** 1.056 gal **Transmission lubricant** 1H Hy Tran fluid **Final drive lubricant** SAE 90 **Total time engine was operated** 53 hours.

ENGINE Make International diesel **Type** 4 cylinder vertical **Serial No** BD 154T 1157 **Crankshaft mounted** lengthwise **Rated rpm** 2000 **Bore and stroke** 3½" x 4" **Compression ratio** 23 to 1 **Displacement** 153.9 cu in **Cranking system** 12 volt electric **Lubrication** pressure **Air cleaner** dry type with replaceable paper element **Oil filter** replaceable paper element **Fuel filter** replaceable treated paper element **Muffler** was used **Cooling medium temperature control** thermostat.

CHASSIS Type tracklayer **Serial No** H 1356-TA **Tread width** 48" **Wheel base** 67" **Drawbar height** 15½" **Measured length of track** 17½ ft **Cleats** integral with shoes **Cleats per track** 35 **Size of cleats** 12" x 2" **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 32.1" Vertical distance above roadway 21.4" Horizontal distance from center of rear wheel tread 0.3" to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial range operator controlled power shifting **Advertised speeds mph** third 1.53 fourth 2.26 fifth 2.42 sixth 3.24 seventh 3.58 eighth 4.40 ninth 4.79 tenth 6.52 reverse 1.43 and 2.12. **Clutch** single plate dry disc operated by foot pedal **Brakes** contracting bands operated independently by two hand levers or by one foot pedal **Steering** hand levers controlling multiple disc clutches and brakes **Turning space diameter** (with brake applied) right 153" left 153" **Belt pulley** none **Power take-off** 980 rpm at 2000 engine rpm.

TOTAL WEIGHT with operator 7970 pounds including crankcase guard 100 pounds.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

First and second gears were not run as these gears are omitted from the tractor when equipped with torque amplifier drive.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 951.

L. F. LARSEN
Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
J. J. SULEK
D. E. LANE
Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. H. Kramer, Director, Lincoln, Nebraska

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, ½ of the 85% torque; maximum power, ¼ and ¾ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

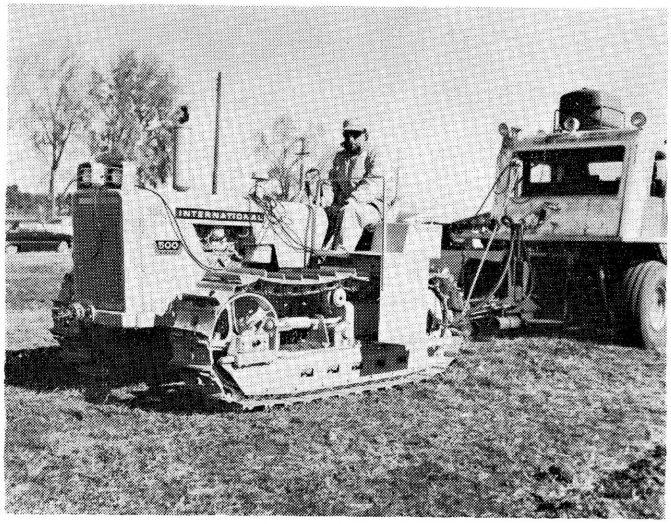
Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions: (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.**



International 500 Diesel